

Zernike Colloquium

Online Event
Google Meet Link:
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**Organic and Perovskite
Photovoltaic Cells and Photodiodes**

Thursday, 16:00h

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Dutch Institute for
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The power conversion efficiencies of organic and metal-halide perovskite solar cells are increasing rapidly and are closing the gap with crystalline silicon. For organic solar cells this progress finds its origin

in the design and development of novel organic and polymer semiconductors with electron donating and electron accepting properties, next to the optimization of the auxiliary layers that improve collection of charges and the device layout. For metal-halide perovskites, materials optimization involves the use of different combinations of metal, organic, and halide ions that control bandgap but also stability. For both types of solar cells a main challenge is further reducing the energy loss between bandgap energy and open-circuit voltage. To establish the origin of remaining loss mechanisms, we use ultra-sensitive photocurrent spectroscopy and measure quasi-Fermi level splitting. These techniques help to identify the location and origin of defects. To really go beyond present efficiency limits, multi-junction solar cells are needed. In this respect, I will discuss our progress and challenges in monolithic and stacked tandem and triple junction devices. Finally I will discuss the use of these devices as photodiodes, i.e. for detecting light, where understanding and reducing the reverse dark current is key to improving the specific detectivity.



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